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Cantlon

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(54) **LAG DRIVER**

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(22) Filed: **Jan. 30, 2012**

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B25B 13/02 (2006.01)
B25B 13/06 (2006.01)
B25B 23/06 (2006.01)

(52) **U.S. Cl.**
CPC ***B25B 13/06*** (2013.01); ***B25B 23/065*** (2013.01)

(58) **Field of Classification Search**
CPC .. B25B 23/0057; B25B 23/065; B25B 13/06; B25B 31/202; B25B 31/1071; B25B 31/207
USPC 81/119, 124.2, 901, 124.1, 125, 121.1, 81/64, 90.1, 90.3, 90.9; 279/90, 89, 93, 279/143, 144
See application file for complete search history.

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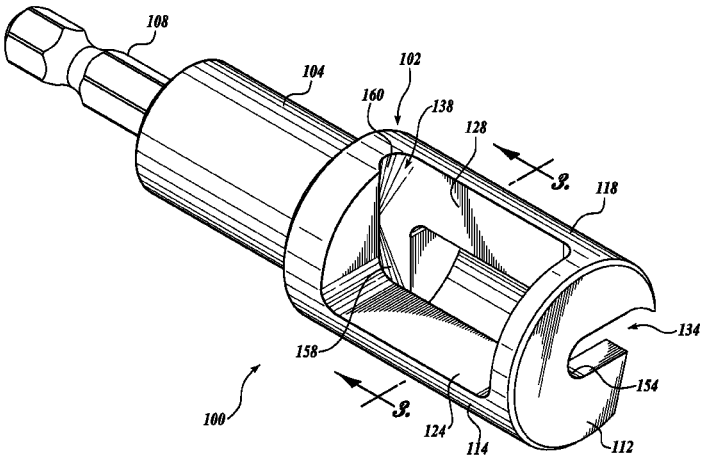
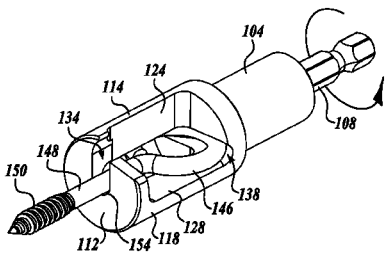
(57) **ABSTRACT**

A lag driver includes a drive shank and a drive body assembly extending from the drive shank. The drive body assembly includes a fastener-receiving portion, wherein a fastener is receivable within the fastener-receiving portion in a first, loading position such that the fastener is positionable in substantial coaxial alignment with the lag driver, and wherein the fastener is rotatable into a second, locked position within the fastener-receiving portion such that the fastener-receiving portion is engageable with a portion of the fastener for applying torque to the fastener.

5 Claims, 3 Drawing Sheets





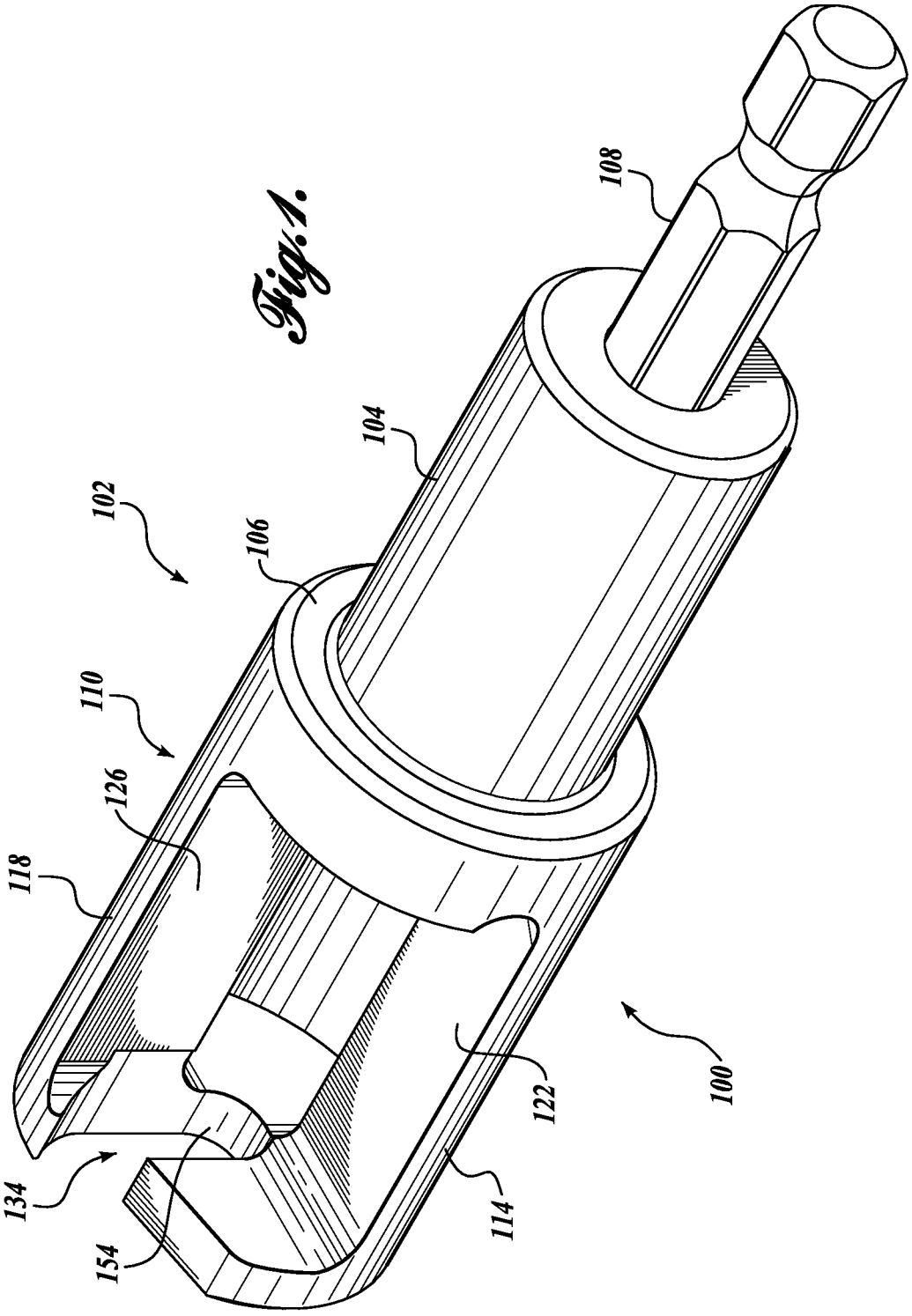
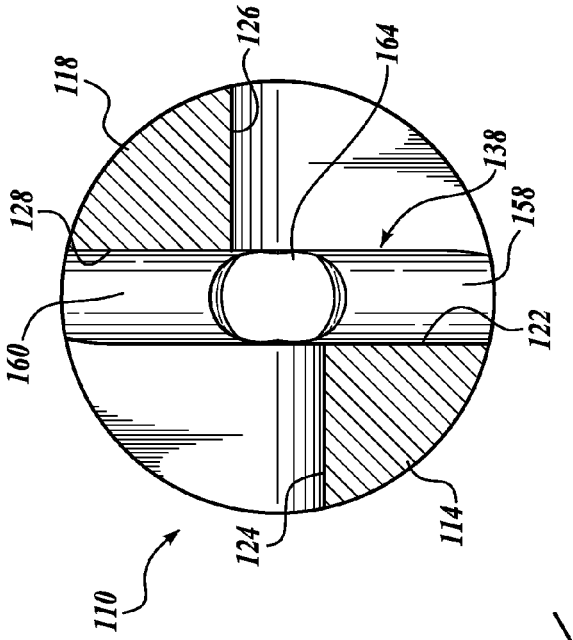


Fig. 1.


126
164
118
138
128
158
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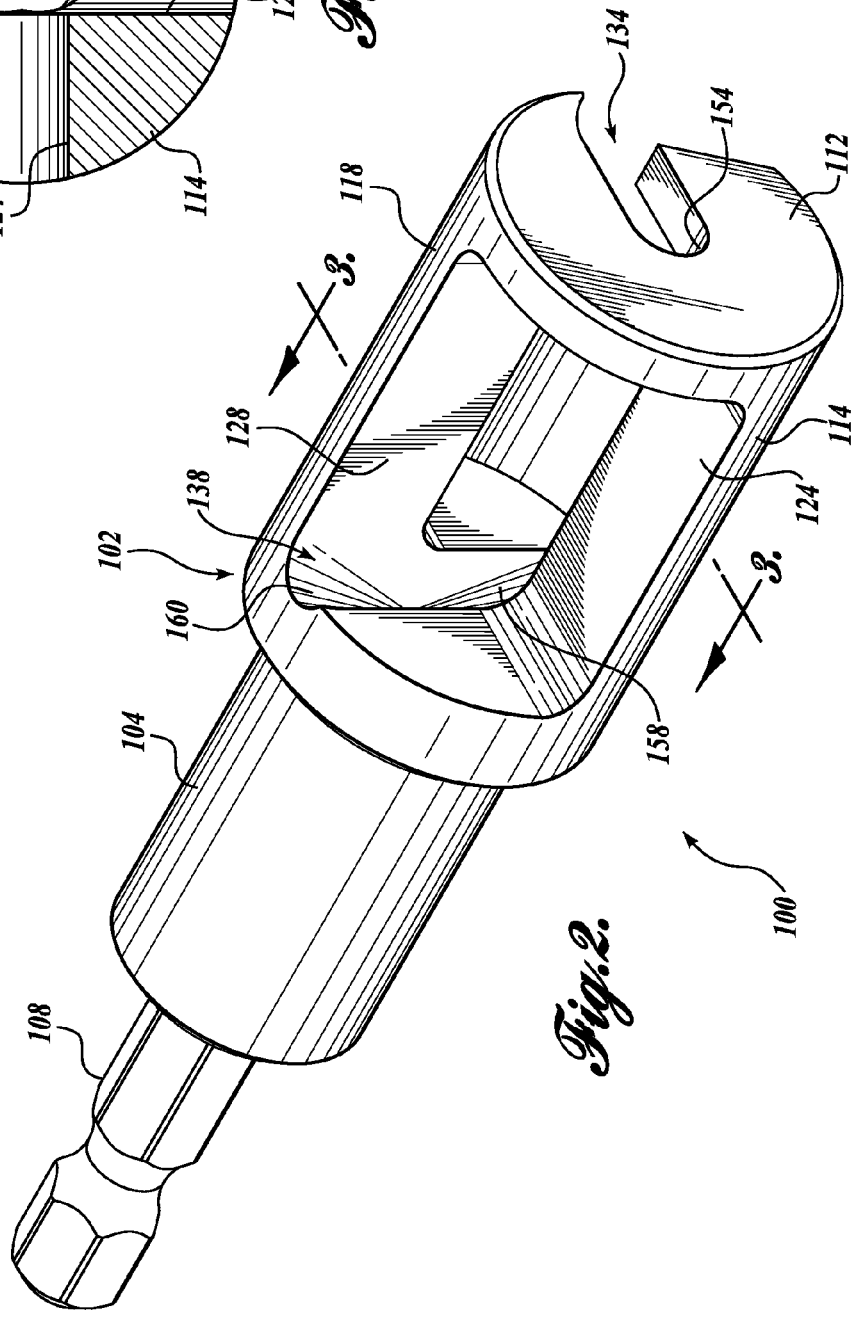
122
124
114
110

Fig.3.


134
154
112
118
3.
128
114
138
124
102
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158
104
108
100

Fig.2.

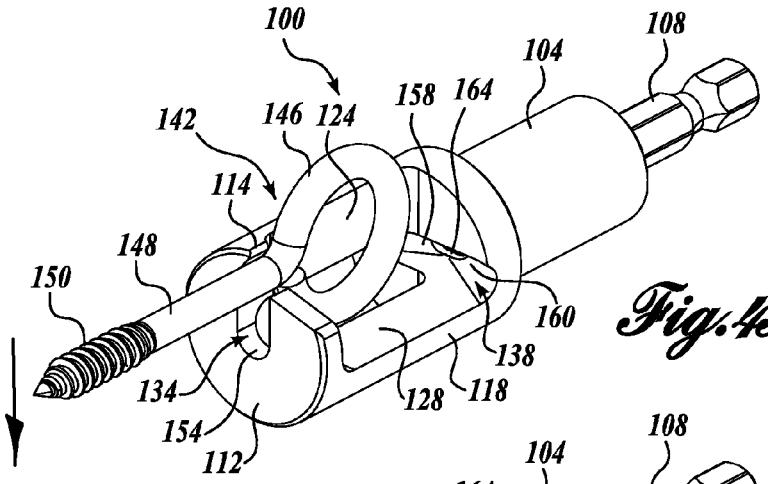

Fig.4A.

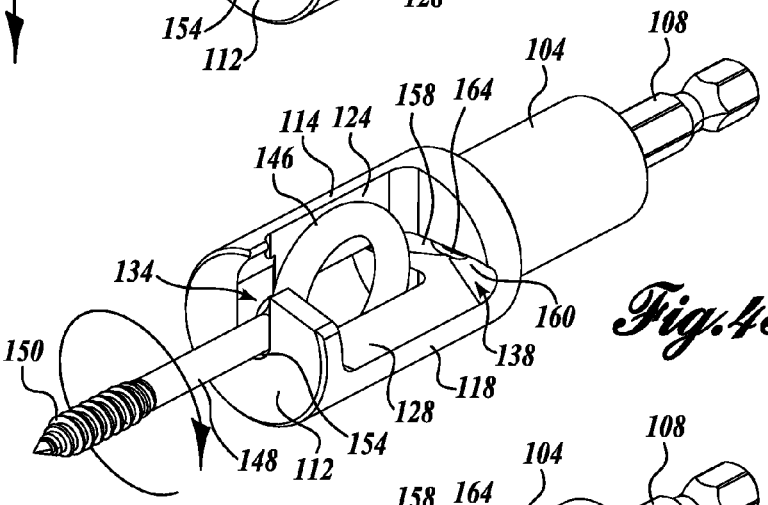

Fig.4B.

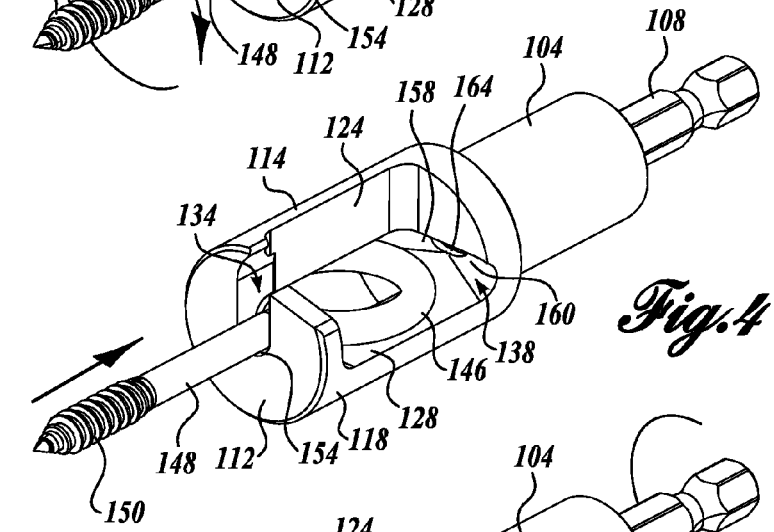

Fig.4C.

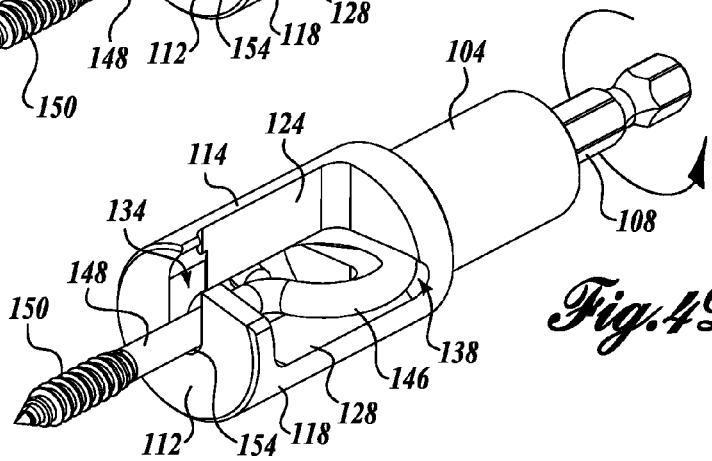

Fig.4D.

LAG DRIVER

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Patent Application No. 61/438,151, filed Jan. 31, 2011, the disclosure of which is hereby expressly incorporated by reference herein.

BACKGROUND

Hook and eye lag screws, as well as other similar types of fasteners (hereinafter collectively referred to as "hook and eye fasteners"), have numerous applications. For instance, a hook or eye fastener can mate with a latch or similar device to releasably secure a gate, door, etc., in a closed position. As another example, a hook or eye fastener can be used to hang an item, such as a coffee cup, a hanging plant, decorations, etc., from a surface (such as a ceiling, wall, cabinet, etc.). It can be appreciated that hook and eye fasteners have a wide range of use and can therefore be mounted in many different types of locations.

Hook and eye fasteners are normally installed manually since the hook or eye portion of the fastener is not engageable with a conventional drill chuck. The manual process is physically intensive since the hook and eye fasteners need to be securely mounted to the desired surface to adequately bear the load of the hanging item. The manual process also normally requires the use of a predrilled pilot hole to mount the fastener. Thus, without the use of a power drill, the process of installing a hook or eye fastener is tedious and time-consuming.

SUMMARY

A lag driver includes a drive shank and a drive body assembly extending from the drive shank. The drive body assembly includes a fastener-receiving portion, wherein a fastener is receivable within the fastener-receiving portion in a first, loading position such that the fastener is positionable in substantial coaxial alignment with the lag driver, and wherein the fastener is rotatable into a second, locked position within the fastener-receiving portion such that the fastener-receiving portion is engageable with a portion of the fastener for applying torque to the fastener.

This summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This summary is not intended to identify key features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

DESCRIPTION OF THE DRAWINGS

The foregoing aspects and many of the attendant advantages of the present disclosure will become more readily appreciated by reference to the following detailed description, when taken in conjunction with the accompanying drawings, wherein:

FIG. **1** is a front isometric view of a lag driver formed in accordance with aspects of the present disclosure;

FIG. **2** is a rear isometric view of the lag driver of FIG. **1**, wherein the lag driver is rotated about its axis ninety degrees;

FIG. **3** is a cross sectional view of the lag driver of shown in FIG. **2**, taken substantially across line **3-3**;

FIG. **4**A is a front isometric view of the lag driver of FIG. **1**, wherein a fastener is shown engaged with the lag driver in a first position;

FIG. **4**B is a front isometric view of the lag driver of FIG. **1**, wherein a fastener is shown engaged with the lag driver in a second position;

FIG. **4**C is a front isometric view of the lag driver of FIG. **1**, wherein a fastener is shown engaged with the lag driver in a third position; and

FIG. **4**D is a front isometric view of the lag driver of FIG. **1**, wherein a fastener is shown engaged with the lag driver in a fourth position.

DETAILED DESCRIPTION

A lag driver **100** formed in accordance with a preferred embodiment of the present disclosure may best be seen by referring to FIG. **1**. The lag driver **100** is generally configured to releasably receive a hook or eye fastener or similar fastener (see FIGS. **4**A-**4**D) and drive the fastener into or out of a medium such as drywall, wood, etc. It should be appreciated that although the lag driver **100** is shown and described with respect to a hook or eye fastener, the lag driver **100** may instead be used with any other suitable fastener. Thus, the descriptions and illustrations herein should not be construed as limiting the scope of the claimed subject matter. Moreover, for ease of illustration and clarity, the lag driver **100** is mostly shown in a substantially horizontal orientation, although it may be suitably used in any orientation, such as vertical. Therefore, terminology, such as "front," "rear," "forward," "rearward," etc., should be construed as merely descriptive and not limiting. Further, although certain geometric shapes may be illustrated and described below, it should be understood that such terms are intended to be merely descriptive and not limiting. Hence, other geometric shapes, such as oval, round, square, etc., are also within the scope of the present disclosure.

Referring to FIGS. **1** and **2**, the components of the lag driver **100** will now be described in detail. The lag driver **100** generally includes a tool attachment shank or drive shank **108** extending coaxially from a drive body assembly **102**. The drive shank **108** is made from a suitable material well known in the art and is suitably sized and shaped to be received and retained within a receptacle or chuck of any standard hand drill, screwdriver, or similar tool that is equipped with the means to drive the shank **108**. For instance, the drive shank **108** may be hex shaped or any other suitable polygonal shape, circular, or any other suitable shape that is configured to be received within a correspondingly shaped chuck of a drill.

The drive body assembly **102** includes a drive body **104** integrally formed with or otherwise secured to the drive shank **108**. The drive body **104** is made from a suitable material well known in the art, such as a suitable metal, and it is any suitable size and configuration, such as cylindrical, rectangular, etc. In the depicted embodiment, the drive body **104** is cylindrical such that it is easily graspable by a user when in use. Moreover, the cylindrical drive body **104** has a substantially circular cross-section such that the drive body **104** may easily rotate within a user's grasp when using the lag driver **100** to drive a fastener into or out of a medium.

The drive body assembly **102** further includes a fastener-receiving body **110** extending from the drive body **104** that is generally configured to releasably receive a hook or eye fastener or similar fastener and drive the fastener into or out of a medium such as drywall, wood, etc. In the embodiment illustrated in FIGS. **4**A-**4**D, the fastener-receiving body **110** is configured for use with an eye fastener **142** having an eye

portion **146** formed at one end, a shaft **148** extending from the eye portion **146**, and a threaded end **150** formed on the shaft **148** opposite the eye portion **146**. As noted above, the lag driver **100** may instead be used with a hook fastener or any other suitable fastener. Thus, the description of the lag driver **100** with reference to an eye fastener **142** is for illustrative purposed only.

The fastener-receiving body **110** is integrally formed with or otherwise secured to the drive body **104** opposite the drive shank **108**. The fastener-receiving body **110** is any suitable overall shape, such as cylindrical, and it has any suitable cross-sectional size to accommodate fasteners of various shapes and sizes. In the depicted embodiment, the fastener-receiving body **110** is also slightly larger in cross-sectional size than the drive body **104**, thereby defining an annular shoulder **106** transverse to the longitudinal axis of the drive body **104** at the intersection of the fastener-receiving body **110** and the drive body **104**. As such, a user may press against the annular shoulder **106** to help stabilize the lag driver **100** when driving a fastener into a medium.

The fastener-receiving body **110** also defines a substantially flat transverse end surface **112** opposite the drive body **104** that is engageable with a medium, when driving a fastener into the medium. The end surface **112** helps to appropriately position the depth of the fastener within the medium by limiting the axial movement of the lag driver **100** toward the medium.

The fastener-receiving body **110** is defined by first and second drive pillars **114** and **118** configured to releasably receive a hook or eye fastener and drive the fastener into or out of a medium. The drive pillars **114** and **118** extend axially between a first end of the fastener-receiving body **110** near the annular shoulder **106** and a second end of the fastener-receiving body **110** near the transverse end surface **112**.

As may best be seen by referring to FIG. **3**, the first drive pillar **114** is defined by a first drive surface **122** and a first load surface **124** extending inwardly from the exterior cylindrical surface of the fastener-receiving body **110**. The first drive surface **122** and the first load surface **124** define an angle therebetween that may be any suitable any, such as ninety degrees (90°). Similarly, the second drive pillar **118** is defined by a second drive surface **128** and a second load surface **126** extending inwardly from the exterior cylindrical surface of the fastener-receiving body **110**. The second drive surface **128** and the second load surface **126** define an angle therebetween that may be any suitable any, such as ninety degrees (90°).

Although the first drive surface **122**, the first load surface **124**, the second drive surface **128**, and the second load surface **126** may be any suitable contour, in the depicted embodiment, the surfaces are flat such that the first drive surface **122** is substantially transverse to the first load surface **124**, and the second drive surface **128** is substantially transverse to the second load surface **126**. In that regard, the first and second drive surfaces **122** and **128** are spaced in a substantially parallel relationship to one another, and the first and second load surfaces **124** and **126** are spaced in a substantially parallel relationship to one another. The predetermined gap or distance between the first and second drive surfaces **122** and **128** and the first and second load surfaces **124** and **126** is sufficient to receive a portion of the fastener, such as the eye portion **146** of eye fastener **142**, therebetween (see FIGS. **4**B and **4**C).

As can be seen by referring additionally to FIGS. **4**A-**4**D, with the eye portion **146** received between either the first and second drive surfaces **122** and **128** or the first and second load surfaces **124** and **126** (or at some rotated, loading position therebetween), the shaft **148** protrudes from a first slot **134** defined in the transverse end surface **112** of the fastener-receiving body **110**. The first slot **134** is sized and configured to receive the shaft **148** of fastener **142** and retain the shaft **148** in coaxial alignment with the center longitudinal axis of the fastener-receiving body **110**.

More specifically, the first slot **134** extends radially from an outer cylindrical surface of the fastener-receiving body **110** toward the center longitudinal axis of the fastener-receiving body **110** and terminates in an axially aligning surface **154**. The axially aligning surface **154** is formed within the first slot **134** at a specified radial distance from the outer cylindrical surface to position the shaft **148** of the eye fastener **142** in substantial axial alignment with center longitudinal axis of the fastener-receiving body **110** when received therein.

The width of the first slot **134** is defined by first and second slot surfaces (not labeled) extending radially inwardly from the outer cylindrical surface of the fastener-receiving body **110**. The first and second slot surfaces are substantially coplanar with the first and second load surfaces **124** and **126** of the first and second drive pillars **114** and **118** so that the width of the first slot **134** is substantially equal to the predetermined distance between the first and second load surfaces. As such, the eye fastener **142** may be loaded into the fastener-receiving body **110** by disposing the eye portion **146** between the first and second load surfaces **124** and **126** and by disposing the shaft **148** within the first slot **134**, as shown in FIGS. **4**A and **4**B. In that regard, the first and second load surfaces **124** and **126** assist in guiding and loading the eye fastener **142** into engagement with the fastener-receiving body **110**.

A second slot **138** is defined within the end of the fastener-receiving body **110** near the annular shoulder **106** for receiving and securing the eye portion **146** of the fastener **142** within the fastener-receiving body **110** in a locked, drive position (see FIG. **4**D) rotated ninety degrees from the loading position described above (see FIGS. **4**A and **4**B). The second slot **138** extends across the fastener-receiving body **110** between opposite cylindrical exterior surfaces of the fastener-receiving body **110** and is substantially transverse to the first slot **134**.

The second slot **138** is sized and configured to receive part of the eye portion **146** of the eye fastener **142** when the eye portion **146** is positioned between the first and second drive surfaces **122** and **128** of the first and second drive pillars **114** and **118**. In that regard, the width of the second slot **138** is substantially equal to the predetermined distance between the first and second drive surfaces **122** and **128** of the first and second drive pillars **114** and **118**.

To help secure the eye portion **146** within the second slot **138** and maintain the eye fastener **142** in substantial coaxial alignment with the fastener-receiving body **110**, the second slot **138** includes first and second slanted surfaces **158** and **160** to define an overall substantially "V" shape. As such, the curved eye portion **146** of the eye fastener **142** may be seated and substantially centered within the second slot **138**. It should be appreciated that the second slot **138** may instead be generally concave in shape or any other suitable shape to receive the head portion of the eye fastener **142** or various other fasteners.

A retaining member may also be disposed within the second slot **138** to help retain the eye portion **146** within the second slot **138**. For instance, the retaining member may be a magnet **164** disposed at the apex of the V-shaped second slot **138** between the first and second slanted surfaces **158** and **160**. The magnet **164** releasably locks the eye portion **146** of the eye fastener **142** within the second slot **138**. It should be appreciated that any other suitable retaining member may instead be used. For instance, a C-shaped spring clip (not

illustrated) may instead be disposed within the second slot **138** for releasably locking the eye portion **146** within the second slot **138**.

As noted above, the eye portion **146** of the eye fastener **142** is securable within the second slot **138** when the eye portion **146** is positioned between the first and second drive surfaces **122** and **128** of the first and second drive pillars **114** and **118**. In this locked, drive position, the sidewall surfaces of the second slot **138** and the first and second drive surfaces **122** and **128** of the drive pillars **114** and **118** are positioned to impose a torque on the eye portion **146** when the lag drive **100** is rotated. Moreover, the first and second drive surfaces **122** and **128**, in combination with the first and second slots **134** and **138**, are positioned to engage the eye fastener **142** to help maintain the coaxial alignment of the eye fastener **142** within the fastener-receiving body **110**. The eye fastener **142** is essentially confined within the fastener-receiving body **110** such that the eye fastener **142** will remain in coaxial alignment with the lag driver **100** and the driving mechanism (such as a chuck of a hand drill) when being driving into or out of a medium.

It should be appreciated that although the fastener-receiving body **110** is described as having a specific shape and configuration to appropriately position the eye fastener **142** in coaxial alignment with the lag driver **100** and impose a torque on the eye fastener **142**, variations in shapes and configurations of the fastener-receiving body **110** may be appreciated by one of ordinary skill in the art. Thus, the foregoing description and illustrations herein should not be construed as limiting the scope of the claimed subject matter.

Referring to FIGS. **4**A-**4**D, the operation of the lag driver **100** will now be described in detail. Referring specifically to FIGS. **4**A and **4**B, the eye fastener **142** is loaded into the fastener-receiving body **110** by disposing the eye portion **146** between the first and second load surfaces **124** and **126** of the first and second drive pillars **114** and **118**. At the same time or thereafter, the shaft **148** of the eye fastener **142** may be disposed within the first slot **134** until the shaft **148** engages the bottom of the slot or the axially aligning surface **154**. In this initial loading position, as shown in FIG. **4**B, the shaft **148** of the fastener is in substantial coaxial alignment with the fastener-receiving body **110** (and therefore, the lag driver **100**).

Referring to FIGS. **4**B and **4**C, the eye fastener **142** is rotated clockwise about its longitudinal axis until the eye portion **146** is disposed between the first and second drive surfaces **122** and **128** of the first and second drive pillars **114** and **118**. The eye fastener **142** is then slid axially into the second slot **138**. The magnet **164** may be of a sufficient strength such that the eye portion **146** is urged into and retained within the second slot **138**. With the eye fastener **142** disposed within the fastener-receiving body **110** in this locked, drive position, as shown in FIG. **4**D, the eye fastener **142** may be both retained in its coaxial position within the fastener-receiving body **110** and driven by the fastener-receiving body **110** into or out of a medium. Specifically, the sidewall surfaces of the second slot **138** and the first and second drive surfaces **122** and **128** of the drive pillars **114** and **118** impose a torque on the eye portion **146** when the lag drive **100** is rotated.

The eye fastener **142** may be removed from the fastener-receiving body **110** by reversing the above-described steps. In particular, the eye fastener **142** may be removed by pulling the eye fastener **142** outwardly away from the second slot **138**, rotating the eye fastener **142** ninety degrees, and removing the eye fastener from its position between the first and second load surfaces **124** and **126** and within the first slot **134**.

It should be appreciated that the above-described steps for loading and unloading the eye fastener **142** are illustrative only, and the steps may instead be carried out in any suitable order and manner and/or in any suitable combination of steps.

As can be seen in FIGS. **4**A-**4**D, the threaded portion **150** of the eye fastener **142** spirals to define a self-starting screw tip in coaxial alignment with the fastener shaft **148**. As such, the user may simply engage the tip of the eye fastener **142** with the medium (such as a wall, ceiling, etc.) to drive the eye fastener **142** into the medium without the need for a pre-drilled screw hole. Thus, the lag driver **100** enables efficient, simple drive operation by maintaining the eye fastener **142** in coaxial alignment with the lag driver **100** during operation. However, it should be appreciated that the lag driver **100** may also be used with fasteners or substrates (such as wood, composites, etc.) requiring a pre-drilled screw hole.

The lag driver **100** provides a tool for safely, efficiently, and accurately installing a hook or eye fastener within a medium. While illustrative embodiments have been illustrated and described, it will be appreciated that various changes can be made therein without departing from the spirit and scope of the invention.

The embodiments of the present disclosure in which an exclusive property or privilege is claimed are defined as follows:

1. A lag driver, comprising:

(a) a drive shank having a longitudinal axis; and

(b) a drive body assembly extending from the drive shank, the drive body assembly having a fastener-receiving body with first and second drive pillars extending axially along a portion of the drive body assembly, the first drive pillar having a first drive surface and a first load surface, the second drive pillar having a second drive surface and a second load surface,

wherein the first and second drive surfaces are in a spaced substantially parallel relationship to one another to define a first predetermined gap between the first and second drive surfaces, the first predetermined gap having a gap width, wherein the first and second load surfaces are in a spaced substantially parallel relationship to one another to define a second predetermined gap between the first and second load surfaces, the first drive surface positioned in a fixed, substantially transverse relationship to the first load surface and the second drive surface positioned in a fixed, substantially transverse relationship to the second load surface,

wherein a fastener is disposable in the second predetermined gap such that it is engageable with the first load surface of the first drive pillar and the second load surface of the second drive pillar in a loading position, and wherein in the loading position the fastener is positionable in substantial coaxial alignment with the lag driver, and wherein the fastener is rotatable into the first predetermined gap in a locked position, the first and second drive surfaces engageable with a portion of the fastener in the locked position when the drive shank is moved about its longitudinal axis in a first direction for applying torque to the fastener, and

further comprising a first slot formed in the fastener-receiving body opposite the drive shank, the first slot in substantial alignment with the first predetermined gap and having a slot width that is substantially equal to the gap width of the first predetermined gap, the first slot configured to removably receive the portion of the fastener and position the portion of the fastener in substantial coaxial alignment with the lag driver.

2. The lag driver of claim 1, wherein the width of the first slot is defined by first and second slot surfaces that are substantially coplanar with the first and second load surfaces of the first and second drive pillars.

3. The lag driver of claim 1, wherein the fastener is rotatable ninety degrees between the loading and locked positions.

4. The lag driver of claim 2, further comprising a retaining member configured to releasably secure the fastener within the fastener-receiving body.

5. The lag driver of claim 4, wherein the retaining member is disposed in the second slot that is substantially transverse to the first slot.

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